

Changes in the Use of Postacute Care during the Initial Medicare Payment Reforms

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Objective. To examine changes in postacute care (PAC) use during the initial Medicare payment reforms enacted by the Balanced Budget Act of 1997.

Data Sources. We used claims data from the 5 percent Medicare beneficiary sample in 1996, 1998, and 2000. Linked data from the Denominator file, Provider of Service file, and Area Resource File provided additional patient, hospital, and market-area characteristics.

Study Design. Six disease groups with high PAC use were selected for analysis. We used multinomial logit regression to examine how PAC use differed by year of service, controlling for patient, hospital, and market-area characteristics.

Principal Findings. There were major changes in PAC use, and a portion of services shifted to settings where reimbursement remained cost-based. During the first reform, the home health agency interim payment system, home health use decreased consistently across disease groups. This decrease was accompanied by increased use in skilled nursing facilities (SNFs). Following the implementation of the prospective payment system for SNFs, the use of inpatient rehabilitation facilities increased.

Conclusions. The shift in usage among settings occurred in two stages that corresponded to the timing of payment reforms for home health agencies and SNFs. Evidence strongly suggests the substitutability between PAC settings. Financial incentives, in addition to clinical needs and individual preferences, play a major role in PAC use.

Key Words. Postacute care, skilled nursing facility, rehabilitation, home health care, Balanced Budget Act

Medicare postacute care (PAC) services provide recuperative or rehabilitative services to patients discharged from acute-care hospitals. As hospital length of stays shortened considerably after the hospital prospective payment system implemented in 1983, these services became a critical transition in the continuum of care for elderly patients. These services—mainly skilled nursing

facilities (SNFs), inpatient rehabilitation units or hospitals (IRFs), and home health agencies (HHAs)—were the fastest growing components of Medicare spending in the 1990s, with an average annual growth rate of 34 percent (Medicare Payment Advisory Commission [U.S.] 2001). In response to such dramatic increases and with widespread administrative and legislative concerns about possible fraud and abuse by providers, both regulators and legislators devoted considerable attention to PAC services in the mid-1990s. Regulators aggressively pursued potential fraud and abuse, particularly in HHAs, whereas Congress mandated payment reforms in the Balanced Budget Act of 1997. These regulatory compliance initiatives and the sequential implementation of payment reforms had the potential to lead to reimbursement-driven substitution between settings without regard to the appropriateness of care. Nevertheless, most studies of PAC payment reforms have focused on each setting in isolation, with little investigation of how they might be used interchangeably. To our knowledge, no analyses have simultaneously considered all three major PAC settings across years and used multivariate methods to control for variables affecting their use. Using such an approach, we examined how usage shifted among PAC settings as payment reforms introduced new financial incentives.

BACKGROUND

PAC use has received increased scrutiny since the mid-1990s, with home care being the main focus of regulatory compliance initiatives. Several federal agencies joined forces to mount Operation Restore Trust, which targeted fraudulent and abusive billings in HHAs, nursing homes, and medical equipment suppliers. These actions started in five states in 1995 and expanded to 18 states by 1998. Under the Health Insurance Portability and Accountability Act of 1996, physicians who purposely certify ineligible beneficiaries for Medicare

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home health benefits are subject to civil and monetary penalties. In 1997, regulators placed a 6-month moratorium on certifying new HHAs and strengthened cost auditing and claims review. However, these measures did not stop the increase in Medicare PAC expenditures because payments remained cost-based. In the Balanced Budget Act of 1997, Congress enacted changed eligibility criteria for PAC services and mandated moving services from retrospective cost-based payments to prospective payment systems.

These payment reforms for major PAC services differed for each setting, including separate case-mix adjusted prospective payment systems, varied implementation timelines, and different instruments for collecting assessment information. With one exception (HHA prospective payment), reforms were phased-in at the beginning of each agency's or facility's fiscal year. The reforms included: (1) for HHAs, an interim payment system, which began in October 1997, followed by a prospective payment system, based on 60-day episodes, which was fully implemented in October 2000; (2) for SNFs, a per-diem prospective payment system implemented in July 1998 with a three-year transition period; and (3) for IRFs, a per-discharge prospective payment system, implemented in January 2002 with a 1-year transition period. During the SNF and IRF transition periods, payments blended a facility-specific rate and the federal case-mix adjusted rate. The SNF prospective payment system did not affect swing bed payments until the cost reporting period on or after July 1, 2002, and critical access hospitals remain exempt from the new payment system. The Act also clarified the eligibility criteria for HHA benefits, including disqualifying beneficiaries for HHA benefits if venipuncture is the only skilled service they require. The HHA interim payment system was intended to control expenditures before the HHA prospective payment system was fully developed. This interim system included a per-visit cost limit and an aggregate per-beneficiary payment limit, but there was no case-mix adjustment. In contrast, the payment rate for each of the prospective payment systems is case-mix adjusted, based on assessment information collected from a setting-specific instrument.

These compliance initiatives and payment reforms have changed both the availability and provision of PAC services. Increased regulatory scrutiny and the HHA interim payment system were associated with large decreases in the number of HHAs and in service use with a greater decrease in visits by home health aides than in skilled visits (United States General Accounting Office 1998; McCall et al. 2001, 2003a, b; Komisar 2002; Liu, Long, and Dowling 2003; Murtaugh et al. 2003; Spector, Cohen, and Pesis-Katz 2004).

The increase in SNF use was modest after the implementation of the SNF prospective payment system in 1998 (Angelelli et al. 2002; Medicare Payment Advisory Commission [U.S.] 2003a, b), and a higher proportion of SNF residents received a moderate level of rehabilitation (White 2003). McCall et al. (2003a) concluded that changes in PAC use differed among diagnosis-related groups and shifting in services occurred.

Reimbursements under PAC payment reforms are setting-specific and based on care provided, but they do not depend on care needs and expected outcomes. Patients often qualify for services from more than one setting, and in most cases regulations do not restrict which setting patients may use. The reforms thus did not take account of the interchangeability among settings. Different PAC settings can provide similar care, despite varying eligibility criteria, coverage rules, and levels of physician involvement. SNFs provide rehabilitation services as do IRFs. With advanced technologies, HHAs can offer some services formerly provided mainly in SNFs. However, the appropriateness of home care and patients' ability to use it depend on the availability of support in the home. Several studies using data from the late 1980s and early 1990s reported that the settings in question are sometimes interchangeable (Neu, Harrison, and Heilbrunn 1989; Swan and Benjamin 1990; Kenney and Dubay 1992; Kenney 1993; Cohen and Tumlinson 1997; Kramer et al. 1997). Neu, Harrison, and Heilbrunn (1989) suggested that SNF and HHA services are substitutable for one another in urban areas. The likelihood of using HHAs is higher in areas with a lower supply of nursing home beds (Swan and Benjamin 1990; Kenney and Dubay 1992; Kenney 1993; Cohen and Tumlinson 1997). Kramer et al. (1997) noted that the use of SNFs and IRFs by stroke and hip fracture patients varied across communities. A recent study concluded that substitution could occur for nonmedical reasons for some diagnosis-related groups (hip and knee procedures, chronic obstructive pulmonary disease, pneumonia, and congestive heart failure), but not for others (stroke and hip fracture) (Gage 1999).

To improve Medicare payment policy, it is essential to describe in detail how the changing financial incentives at different stages of recent payment reforms influenced changes in PAC use. As these settings are to some extent substitutable for one another, it is crucial to analyze them as a group. After controlling for patient, hospital, and market-area characteristics, we examined changes in PAC use during the initial years of recent payment reforms (1996–2000) to investigate how the reforms influenced use at different stages of implementation. We expected to find shifts in PAC use as sequential new payment systems came into play. Specifically, we hypothesized that the

substantially decreased HHA use following compliance initiatives starting in 1995 and the implementation of the HHA interim payment system in October 1997 would be accompanied by increased SNF use. We also expected that, after the implementation of the SNF prospective payment system in July 1998, IRF use would increase for rehabilitative conditions (stroke, hip and knee procedures, and hip fracture).

METHODS

Data Sources and Population Studied

Our analyses focus on the major PAC settings covered by Medicare Part A, including SNFs, IRFs, and HHAs. We used claims data from the 5 percent Medicare beneficiary sample for calendar years 1996–2000. The data cover the initial years of payment reforms, including the implementation of the HHA interim payment system, and the SNF prospective payment system, but before the full HHA prospective payment system and the IRF prospective payment system. Although swing beds continued to be covered as cost-based reimbursement during our study period, we included swing bed use in the SNF category to be consistent with other studies and reports and to retain the consistency of comparison in all market areas. Throughout the study period, about 1–4 percent of patients were discharged to swing beds, which accounted for 6–10 percent of SNF use in the current study. The percentage of patients discharged to swing beds was stable across years.

We included Medicare beneficiaries age 65 and older, who were discharged alive from a hospital with one of eight diagnosis-related groups, which we consolidated into six major illnesses or procedures. In summarizing results, we classified them into rehabilitative conditions (stroke, hip and knee procedures, and hip fracture) and medical conditions (chronic obstructive pulmonary disease, pneumonia, and congestive heart failure). These six disease groups accounted for almost one-third of PAC use after hospitalization (Medicare Payment Advisory Commission [U.S.] 1998). We linked these patients' subsequent PAC use to their index hospitalizations which were each individual's first hospital discharge in each year. We treated hospitalizations for different diagnosis-related groups in the same year as independent events, and we treated each year as an independent sample. We further linked these health care utilization data to the Medicare Denominator file the Provider of Service file and the Area Resource File for patient, hospital, and market-area characteristics. We excluded patients if: (1) Medicare benefits were for end-stage

renal disease, (2) the primary payer was not Medicare, or (3) the patient was enrolled in a managed care organization. In the multivariate analysis, we also excluded patients who were hospitalized for medical conditions but discharged to IRFs because there were few such cases.

We reviewed patterns of PAC use from 1996 to 2000 for the six major illnesses or procedures included in our dataset before conducting regression analyses. We limited our regression analyses to data from calendar years 1996, 1998, and 2000 because they encompass the distinct phases of initial payment reforms enacted by the Balanced Budget Act of 1997. Neither calendar years nor federal fiscal years cleanly separate specific reforms for two main reasons: (1) for the same type of provider, reforms were generally phased in according to the start of the provider's fiscal year and (2) across various types of providers, reforms were implemented in a sequence with different transition periods. We performed analyses using two time periods—January 1 to June 15, and January 1 to November 30—for index hospitalizations in calendar years 1996, 1998, and 2000. The conclusions derived from both time periods were substantially the same. Therefore, we report results based on January 1 to June 15, since this time period avoids the inclusion of the overlapped payment reforms in 1998 and 2000. The time period also allows a 15-day window for PAC use before the implementation of the SNF prospective payment system in July 1998.

The data we used in the study represent three distinct phases of payment reforms. First, data from January 1 to June 15 in 1996 represent the period before the HHA interim payment. We chose 1996 as the reference year for HHA use because it peaked in 1996 (United States General Accounting Office 1999), even though compliance initiatives for HHAs started in 1995 in five states. Second, data from the first six months of 1998 mainly represent the period before the SNF prospective payment system began. Thus, we treated 1998 as an updated reference year for SNF use. Data from this period also represent a transitional time for HHA use for several reasons: (1) as of January 1, 1998, HHA interim payment system was phased in for more than half of HHAs (61 percent) (United States General Accounting Office 1999), and (2) Operation Restore Trust expanded to 18 states in 1998. Third, data from 2000, the end point of our dataset, represent the period that HHAs and SNFs had all phased into new payment systems, but this time period was before the implementation of the HHA prospective payment system.

Comparing PAC use between 1996 and 2000 allows us to understand the effects of the HHA interim payment system with all HHAs being phased in. Even though 1998 was a transitional period for HHA use, the comparison

between 1996 and 1998 remains meaningful because a substantial decrease in HHA use occurred right after the implementation of HHA interim payment system in October 1997 (United States General Accounting Office 1998; McCall et al. 2001, 2003a, b; Komisar 2002; Liu, Long, and Dowling 2003; Murtaugh et al. 2003; Spector, Cohen, and Pesis-Katz 2004), and many HHAs closed during the first 9 months of the reform (United States General Accounting Office 1998). Moreover, because the SNF prospective payment system began in July 1998, the selection of years allows us to examine how PAC use changed when two separate payment systems were implemented sequentially at potentially substitutable settings.

Dependent Variables

The dependent variable in the analysis was the PAC setting. We employed a four-category variable for rehabilitative conditions (No Service use, SNF, HHA, and IRF) and a three-category variable for medical conditions (No Service use, SNF, and HHA). The "No Service" category was the reference category in all analyses. For HHAs, we counted service as immediate if it started within 4 days of the index hospital discharge to account for a gap that often occurs between hospital discharge and the start of service.

Independent Variables

To frame the multivariate analysis, we included variables in the model based on the Anderson behavioral model (Andersen and Newman 1973; Andersen 1995). The names and definitions of independent variables appear in Appendix 1. Appendix 2 summarizes the characteristics of our study sample by disease groups for the 3 years combined, i.e., January 1 to June 15 for 1996, 1998, and 2000. We organized independent variables into three groups: patient, hospital, and market-area characteristics. Patient characteristics included demographic variables, such as age, gender, and race, which represent predisposing factors that influence health services utilization. Socioeconomic status was represented by state buy-in status, which included Medicaid recipients and additional individuals for whom the state pays Medicare Part B premiums. We represented the illness level using indicators for a long hospital length of stay (exceeding the 75th percentile for the specific disease) and the number of chronic conditions. We counted up to 13 chronic conditions (Iezzoni et al. 1994) found in secondary diagnoses to represent the multiple chronic conditions frequently experienced by the elderly. The chronic conditions are

listed in Appendix 1. The results based on the number of chronic conditions were similar to the Charlson comorbidity index (Charlson et al. 1987).

Hospital characteristics reflect factors that could affect access to PAC services. Our variables identified hospitals that owned PAC settings. We also classified hospitals as for-profit, not-for-profit, or government-owned. We also included the number of staffed and licensed beds as an indicator of hospital size.

Market-area characteristics may constrain PAC use. All market-area characteristics were at the county level. Counties in a metropolitan statistical area were considered urban. We expressed PAC supply variables in terms of rates per 1,000 elderly in a county. These PAC supply variables included the number of SNF beds, the number of IRF beds, and the number of full-time equivalent registered nurses employed by HHAs. Other market-area variables included managed care penetration, percentage of elderly population, and census division.

Statistical Analysis

We used multinomial logistic regression to examine PAC use after adjusting for patient, hospital, and market-area characteristics. Year indicators were part of the model. The estimates for these year indicators represent the adjusted overall effect of receiving care in that year as compared with a reference year, and thus reflect payment reforms in place at that time. We present results from separate analyses using 1996 as the reference year for 1998 and 2000, and using 1998 as the reference year for 2000. The alternate reference years allow us to examine the complete pairwise comparisons between years. We quantified the association between “year” and PAC use in two ways. First, the results are expressed as odds ratios along with 95 percent confidence intervals, which allow an estimate of precision and statistical significance. For a given year, the estimated odds ratio provides a covariate-adjusted estimate of the change in the odds of service use for each type of PAC setting relative to a reference year.

Second, selecting representative values for covariates, we derive adjusted probability of each PAC setting for each of the 3 years. To obtain these estimates, we held constant patient, hospital, and market-area variables, using the modal category for nominal and ordinal scaled independent variables and the median value for continuous variables. These representative values (typical covariate patterns) are shown in Appendix 3. Then, using the estimated regression coefficients, we calculated the probability of using each setting in 1996, 1998, and 2000. The model-based probabilities can be interpreted as an

estimate of the proportion of patients discharged to each PAC setting in each year if patient, hospital, and market-area circumstances remained unchanged. We used the differences in the estimated proportion of service use between years to illustrate the shift in services.

RESULTS

Table 1 presents patterns of No Service use and immediate use of SNFs, HHAs, and IRFs from January 1 to June 15 in 1996, 1998, and 2000. Patients discharged from hospitals for rehabilitative conditions had a higher proportion of using PAC services (ranging from 59 to 84 percent in 2000) than those discharged for medical conditions (ranging from 28 to 36 percent in 2000).

Table 1: Immediate PAC Use from January 1 to June 15 in 1996, 1998, and 2000 (Unadjusted Percentages)

	<i>N</i>	<i>No Service</i>	<i>SNF</i>	<i>HHA</i>	<i>IRF</i>
Stroke					
1996	6,167	40.0	32.2	14.4	13.4
1998	5,714	39.0	35.9	11.1	14.0
2000	5,143	41.0	31.9	11.5	15.6
Hip and knee procedures					
1996	6,612	19.4	39.6	21.0	20.1
1998	6,489	17.0	45.5	16.9	20.6
2000	6,389	18.3	40.9	16.2	24.6
Hip fracture					
1996	3,180	16.6	62.0	8.1	13.3
1998	3,085	15.1	67.5	5.0	12.4
2000	2,915	15.6	63.7	5.9	14.8
Chronic obstructive pulmonary disease					
1996	5,995	71.3	9.3	19.5	0.6
1998	6,776	70.8	12.5	16.7	0.6
2000	6,473	72.0	12.4	15.6	0.9
Pneumonia					
1996	8,914	65.2	18.5	16.4	0.6
1998	11,259	62.9	21.9	15.2	0.6
2000	11,421	64.5	21.6	14.0	0.9
Congestive heart failure					
1996	10,833	64.6	12.2	23.3	0.4
1998	10,822	65.7	15.4	18.9	0.7
2000	10,405	66.3	15.2	18.5	1.0

PAC, postacute care; SNF, skilled nursing facility; HHA, home health agency; IRF, inpatient rehabilitation unit or hospital.

Consistent with other studies (McCall et al. 2001, 2003a, b; Komisar 2002; Liu, Long, and Dowling 2003; Murtaugh et al. 2003; Spector, Cohen, and Pesis-Katz 2004), HHA use decreased dramatically and IRF use increased. SNF use went through a two-stage change over the study period, an initial overall increase followed by a decrease for some conditions as described below. Although the absolute (as opposed to relative) differences in PAC use between years were not large, the relative differences were substantial in most cases. For example, between 1996 and 2000, the absolute difference in HHA use for congestive heart failure was 4.8 percent, which is a relative difference of 21 percent. Even so, the proportion of patients using no PAC services remained relatively stable. This implies that there was a substantial shift in services among settings. Despite changes in PAC use between 1996 and 2000, SNFs remained the dominant setting for rehabilitative conditions, while IRF use increased and HHA use decreased. SNF use neared the level of HHA use for the two chronic medical conditions (chronic obstructive pulmonary disease and congestive heart failure), and SNFs remained the most frequently used setting following hospitalization for pneumonia.

Table 2 and Figure 1 present the association of PAC use with study years. For each type of PAC setting, odds ratios and 95 percent confidence intervals in Table 2 show statistical associations between service use and years. To illustrate the shift in usage between settings, Figure 1 presents absolute differences in the regression adjusted proportion of PAC use. The complete estimation results of the multinomial logistic regression on PAC use for each disease group are presented in Appendix 4. HHA use significantly decreased for both rehabilitative and medical conditions. The largest decrease occurred during the year following implementation of the HHA interim payment system in October 1997. For example, Table 2 shows the odds of HHA use significantly decreased 28 percent for hip fracture and 20 percent for congestive heart failure in 1998. The trend of decrease continued from 1998 to 2000 for only two diseases: chronic obstructive pulmonary disease and pneumonia. When comparing 2000 with 1996, the decrease was more substantial for the two chronic medical conditions, i.e. chronic obstructive pulmonary disease and congestive heart failure, than for other diseases.

SNF use increased significantly from 1996 to 1998 for all disease groups studied (an 18–32 percent increase in the odds). During this period, SNFs continued to be reimbursed on a cost basis. After Medicare began implementing prospective payment in SNFs in July 1998, service use decreased significantly for stroke and hip and knee procedures (a 17 percent decrease in the odds) but did not show significant changes for hip fracture and medical

Table 2: Associations of Year of Service with PAC Use, Adjusted Odds Ratios and 95 Percent Confidence Intervals (January 1 to June 15 in 1996, 1998, and 2000)

	<i>SNF versus No Service</i>	<i>HHA versus No Service</i>	<i>IRF versus No Service</i>
Stroke (DRG 14)			
1998 versus 1996	1.18 (1.08, 1.29)	0.83 (0.73, 0.93)	1.06 (0.94, 1.19)
2000 versus 1998	0.83 (0.76, 0.92)	1.01 (0.88, 1.15)	1.04 (0.92, 1.17)
2000 versus 1996	0.98 (0.89, 1.08)	0.83 (0.73, 0.94)	1.10 (0.97, 1.24)
Hip and knee procedures (DRG 209)			
1998 versus 1996	1.32 (1.19, 1.46)	0.92 (0.82, 1.04)	1.04 (0.92, 1.17)
2000 versus 1998	0.83 (0.75, 0.99)	0.93 (0.82, 1.05)	1.22 (1.08, 1.37)
2000 versus 1996	1.09 (0.98, 1.21)	0.86 (0.76, 0.97)	1.27 (1.13, 1.43)
Hip fracture (DRGs 210 and 211)			
1998 versus 1996	1.19 (1.03, 1.37)	0.72 (0.56, 0.91)	0.96 (0.79, 1.17)
2000 versus 1998	0.87 (0.75, 1.01)	1.16 (0.89, 1.51)	1.17 (0.96, 1.43)
2000 versus 1996	1.03 (0.89, 1.20)	0.83 (0.65, 1.06)	1.13 (0.92, 1.38)
Chronic obstructive pulmonary disease (DRG 88)			
1998 versus 1996	1.31 (1.16, 1.48)	0.85 (0.77, 0.93)	
2000 versus 1998	0.94 (0.82, 1.01)	0.90 (0.81, 0.99)	
2000 versus 1996	1.20 (1.05, 1.36)	0.76 (0.68, 0.84)	
Pneumonia (DRGs 89 and 90)			
1998 versus 1996	1.22 (1.13, 1.32)	0.97 (0.89, 1.05)	
2000 versus 1998	0.94 (0.88, 1.01)	0.91 (0.84, 0.98)	
2000 versus 1996	1.15 (1.06, 1.24)	0.88 (0.81, 0.95)	
Congestive heart failure (DRG 127)			
1998 versus 1996	1.27 (1.16, 1.38)	0.80 (0.75, 0.86)	
2000 versus 1998	0.94 (0.86, 1.02)	0.97 (0.90, 1.05)	
2000 versus 1996	1.18 (1.08, 1.29)	0.78 (0.73, 0.84)	

Note: For medical conditions, IRF use was excluded in multivariate analyses; bold-faced odds ratios and 95 percent confidence intervals represent statistical significance ($p < .05$).

PAC, postacute care; SNF, skilled nursing facility; HHA, home health agency; IRF, inpatient rehabilitation unit or hospital.

conditions. When comparing 2000 with 1996, SNF use did not change significantly for rehabilitative conditions, but it increased substantially for medical conditions (a 15–20 percent increase in the odds).

In contrast, IRF use did not increase until the prospective payment system was implemented in SNFs between 1998 and 2000. IRF use remained similar over the study period for stroke, but it increased noticeably for hip and knee procedures, and it showed an increasing trend, though not a statistically significant one, for hip fracture from 1998 to 2000. At the same time, the number of IRFs increased by 4 percent between 1997 and 1999 (McCall et al. 2003a). The increase in IRF supply and use may be attributable to the cost-based reimbursement for IRFs during the study period.

Figure 1: Differences in Immediate PAC Use between Years, Based on Adjusted Proportion of PAC Use

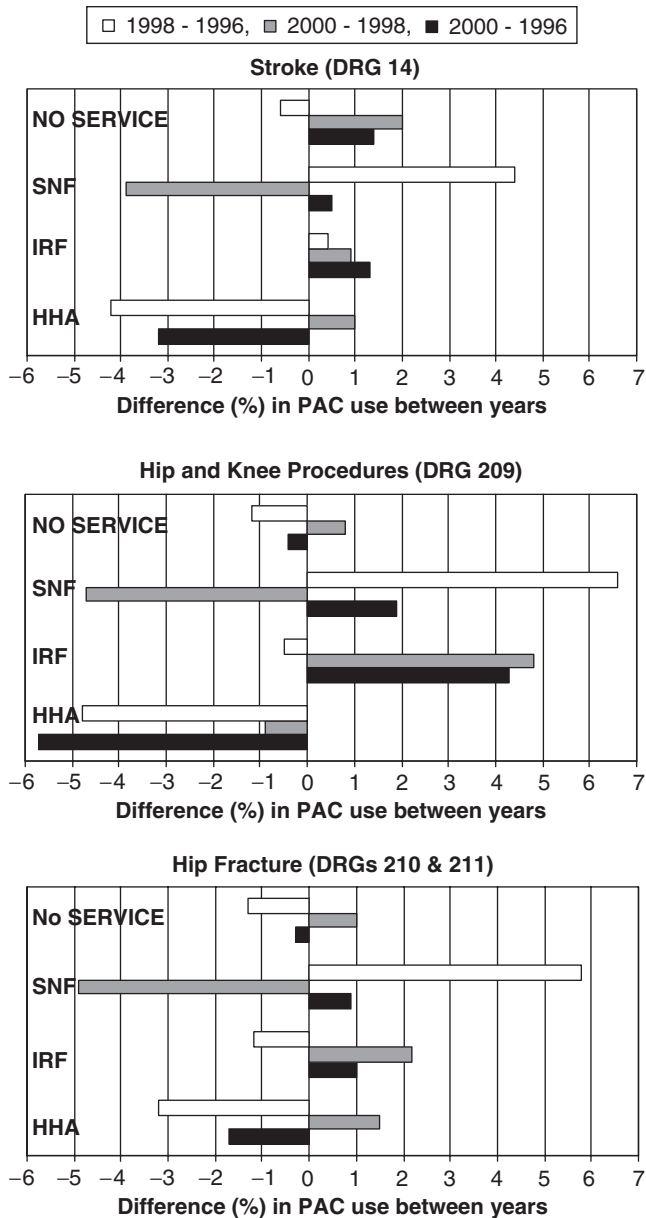
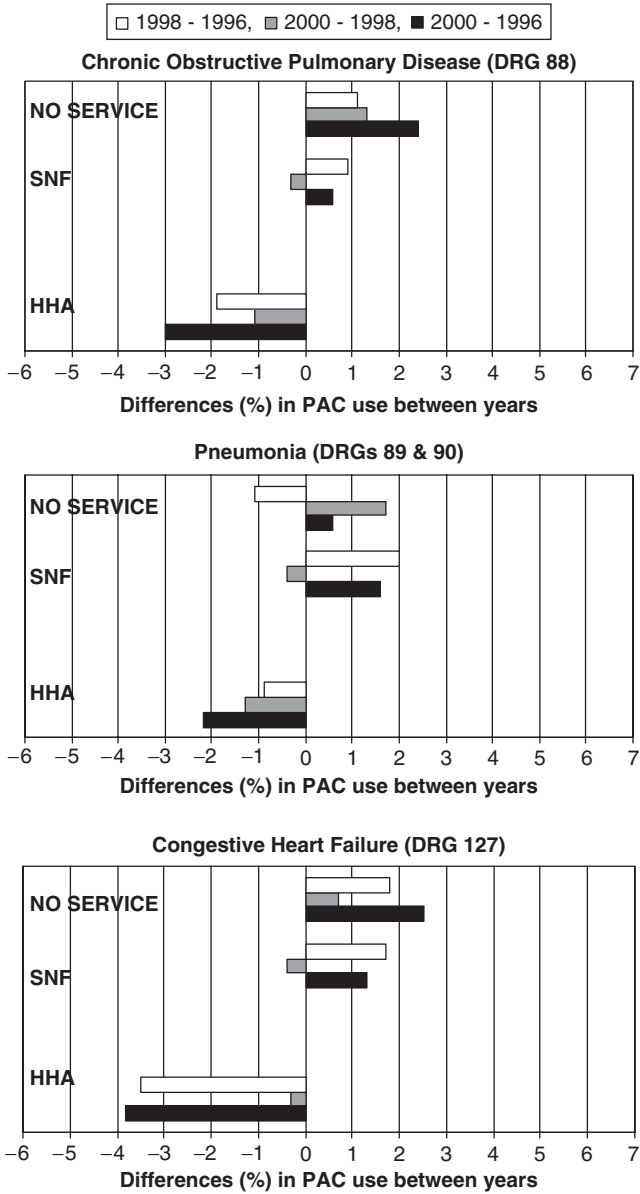


Figure 1: *Continued*



To further illustrate shifting usage among settings, Figure 1 presents absolute differences in PAC use for selected time periods. These regression-adjusted estimates held constant representative values for patient, hospital, and market-area covariates. Shifts in usage among settings corresponded to the sequential implementation of reforms. During the first stage, from 1996 to 1998, the HHA interim payment system began implementation in October 1997. HHA use declined substantially during this period and was mainly accompanied by increased SNF use for all diseases we studied, as well as by increased numbers of patients with chronic medical conditions receiving no service. IRF use for rehabilitative conditions changed minimally. Choosing the example of hip and knee procedures, HHA use decreased 5 percent, SNF use increased 7 percent, and IRF and No Service use changed minimally. On a relative scale, these changes were even more prominent: 14 and 24 percent for changes in HHA and SNF use, respectively.

More changes occurred during the second stage, from 1998 to 2000. During this period, the SNF prospective payment system began to phase in starting in July 1998. Although HHA use continued to decrease, the magnitude was attenuated for almost all diseases, except pneumonia. SNF use substantially decreased, especially for rehabilitative conditions, which contrasts with the increased SNF use in the first stage. The decreased SNF use from 1998 to 2000 was mainly accompanied by increased IRF use for hip and knee procedures and hip fracture, and by an increase in No Service use for stroke. Again, taking the example of hip and knee procedures, HHA use changed minimally, but SNF use decreased 5 percent, and IRF use increased 5 percent (14 and 28 percent relative differences, respectively).

DISCUSSION

The initial years of PAC payment reforms saw a substantial shift in usage among settings. The overall decrease in HHA use attenuated after 1998. Changes in SNF use showed big swings, especially for rehabilitative conditions. IRF use increased consistently. Changes in No Service use also showed swings for rehabilitative conditions and pneumonia, but the changes were in the opposite direction of changes in SNF use. These changes coincided with expanding compliance initiatives and even more strongly with new financial incentives from sequential payment reforms. The observed changes support the substitutability of settings, for at least some patients.

Medicare expenditures for HHA and SNF use decreased substantially after initial payment reforms. Nevertheless, the cost-savings could have been

higher if service shifting to more costly settings had not occurred. For example, based on average Medicare payments for SNFs and HHAs in 1998, the increased SNF use cost Medicare an additional \$62 million and \$83 million for stroke and hip and knee procedures, respectively. Similarly, McCall et al. (2003a) concluded that 15 percent higher savings would have been possible if there was no increased use of IRFs and long-term care hospitals during the first six months of fiscal year 1999. Unfortunately, lacking the directly comparable assessments across settings, we cannot determine whether service shifts resulted in differences in quality of care and outcomes.

The steep decline in HHA use is consistent with other studies (McCall et al. 2001, 2003a, b; Komisar 2002; Liu, Long, and Dowling 2003; Murtaugh et al. 2003; Spector, Cohen, and Pesis-Katz 2004) and not surprising because reimbursement decreased dramatically under the HHA interim payment system and regulators were closely watching HHA billings and benefit eligibility. Most of the decrease we found occurred in the year immediately after the first HHA payment reform and attenuated afterwards. However, in a separate analysis that extended the study periods to November 30 in each year, we found a trend of continued decline in HHA use through 2000, although to a lesser degree, for most disease groups studied. The trend may be attributable to providers' anticipatory behavior regarding the HHA prospective payment system implemented in October 2000. Further study is required to confirm this.

The shift in usage among PAC settings described above corresponded to the timing of the implementation of two payment systems, i.e., the HHA interim payment system beginning in October 1997 and SNF prospective payment system beginning in July 1998. The relative stability of the percentage of patients who did not use PAC services in these two stages indicates settings are substitutable for one another for at least some patients. These changes suggest that PAC services are sensitive to financial incentives. When new and generally more restrictive payments systems began, the use of such services decreased. In contrast, we observed increased use and supply in settings where reimbursement continued on a cost basis. Because payment reforms across settings were sequentially implemented, changing financial incentives encouraged several shifts in services over time. Nevertheless, the shift in usage among PAC settings presented here is a summary effect after all possible shifting has occurred. The exact path of shifts may be more complicated, and the magnitude of substitution between any two given settings may be larger than presented here.

McCall et al. (2003a) found little evidence of increased overall mortality and health care utilization, including emergency room use and hospital

readmission, after the initial years of payment reforms. However, we do not know whether patients' needs were met. Although some of the decline in HHA care might have represented eliminating care that was fraudulent or of marginal benefit, initial increases in SNF care could in part have represented the need to seek services in a different setting. Nor do we know whether outcomes were improved or worsened with service shifts. Using alternative services does not necessarily imply equal effectiveness or equal care costs (Kramer et al. 1997; Chen, Kane, and Finch 2000; Kane et al. 2000). Kramer et al. (1997) reported that hip fracture patients had comparable outcomes in SNFs and IRFs but that stroke patients fared better in IRFs; however, Medicare costs for IRFs were far more expensive. Kane et al. (2000) concluded that HHA services for various conditions, including stroke and hip fracture, were more appropriate for achieving optimal outcomes than SNF care or receiving no service. HHA services for stroke and hip fracture were also more cost effective than services provided in SNFs or IRFs (Chen, Kane, and Finch 2000).

Our study has several limitations. First, our analysis can only partially isolate the effects of concurrent compliance initiatives and payment reforms, and cannot exclude effects from other possible concurrent events. However, HHA use reached its peak in 1996, despite the fact that more than one-third of Medicare and Medicaid beneficiaries resided in the original five states that Operation Restore Trust focused on in 1995. This supports our decision to use 1996 as the reference year for HHA use. Moreover, the HHA interim payment system have played a decisive role because, just after its implementation began, there was a substantial decrease in HHA use and a great number of HHAs closed. To further clarify this issue, we compared PAC use in states involved in the first two waves of Operation Restore Trust (1995 and 1998) to other states. Changes in service use generally followed the same pattern. Thus, while not discounting compliance initiatives, we believe the HHA interim payment system was more significant in the dramatic changes that followed its implementation.

Second, our data cover only the period of the implementation of the HHA interim payment system and the SNF prospective payment system. Although we found substantial redistribution of PAC use during the initial payment reforms, the utilization pattern may have changed further with the full implementation of prospective payment systems in all settings. Third, despite the inclusion of a range of patient, hospital, and market-area characteristics in the regression analysis, claims data do not provide information on discharge functional status and the availability of informal caregivers. Fourth, the lack of directly comparable admission and discharge assessments across

PAC settings hamper our ability to model the possible magnitude of service shifts and impede our understanding of the consequences of the shifts identified here.

Ideally, PAC usage would be determined by clinical needs and individual preferences. However, our findings suggest that financial incentives also play an important role. The new financial incentives across settings resulted in “balloon effect” changes: Squeezing a balloon in one place leads to an expansion in another place. Before the PAC payment reforms, care, and costs shifted vertically from hospitals down to PAC settings. With the sequential payment reforms, care, and costs shifted horizontally among PAC settings. However, these shifts may vary from area to area because of existing geographic variation in PAC supply and use (Kane, Lin, and Blewett 2002). Medicare pays differently for similar care delivered in different settings. However, the outcomes of such substitution may not be optimal (Kramer et al. 1997; Chen, Kane, and Finch 2000; Kane et al. 2000). The current payment reforms have achieved their goal of cost control within each setting. Now that prospective payment systems are in place for all PAC settings, further studies should examine the outcomes of patients discharged to different settings.

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SUPPLEMENTARY MATERIAL

The following supplementary material is available for this article online:

APPENDIX 1: Variable Definitions.

APPENDIX 2: Descriptive Statistics by Disease Groups.

APPENDIX 3: Typical Covariate Patterns by Disease Groups.

APPENDIX 4: Estimates of the Payment Reforms on Medicare PAC Use (Odds Ratio and 95% Confidence Intervals): January 1 to June 15 in 1996, 1998, and 2000.